

**SPECIFICATIONS FOR A FIVE-YEAR LEASE  
OF TWO GRADERS BASED ON 900 HOURS PER YEAR**

**ROAD DEPARTMENT  
DETAILED SPECIFICATIONS  
ALL-WHEEL DRIVE ARTICULATED GRADERS**

EACH NEW UNIT MUST MEET OR EXCEED THE FOLLOWING SPECIFICATIONS:

1. General:

- (a) Each machine shall be a new, articulated, all-wheel drive motor grader with a full height, sound-suppressed ROPS (rollover protection structure), and air-conditioned cab.
- (b) Must have dealership with parts and service department within ten (10) miles of Kalispell, Montana.
- (c) Machine shall be designed and built by manufacturer.
- (d) Machine will include grade control and will be wired for ARO ready, Smart Grade or equivalent.

2. Weight:

Operating weight (typically equipped) shall not be less than 45,000 lbs.  
(Standard machine with full fuel tank, coolant, and 200 lb. operator.)

3. All-Wheel Drive:

Electronically controlled, dual displacement wheel motors that deliver **high displacement** in gears 1-4 forward and 1-3 reverse and **low displacement** in gears 5-7 forward and 4-5 reverse. Front wheels freewheel in eight (8) forward and six (6) reverse.

All components built by motor grader manufacturer.

4. Operating Modes

Three (3) all-wheel drive operating modes shall be available: automatic, manual, and off.

Automatic Mode

Automatic mode shall automatically increase torque to front wheels as rear-wheel slip increases; power is provided to the front wheels only when needed, reducing hydraulic system heat.

Manual Mode

Manual mode shall give the operator 100% control of torque distribution to front wheels.

5. Powertrain:

- (a) The engine shall be designed and built by machine manufacturer.

Engine shall be diesel, turbo-charged, direct injection, four (4) stroke, and six (6) cylinder.

Engine shall have a piston displacement not less than 548 cu in.

Must meet or exceed all U.S. EPA Tier 4 Emission Standards.

Engine shall reach no less than the following SAE net horsepower in gears 1-8:  
1st: 235; 2nd: 250; 3rd: 265; 4th: 275; 5th: 280; 6th: 290; 7th: 300; 8th: 290 HP.

Engine will have a minimum torque rise of 39% to 47%

Engine shall be certified EPA Tier 4 Final and European Union Stage IV.

Ether starting aid.

Engine primary and final fuel filters shall have 500-hour service replacement intervals.

Engine air cleaner shall be dual element dry-type.

Engine air cleaner shall have a service indicator.

Machine shall be equipped with 24V direct electric starting system with 200-amp alternator, 1400 CCA extra heavy duty batteries, and low temperature starting system.

Machine to be equipped with engine coolant heater – 110 volt.

Fuel tank capacity shall not be less than 104 U.S. gallons with ground level access for fueling. Fuel level gauge with in-cab readout mounted in front of operator.

Hydraulic demand fan for automatically adjusting cooling fan speed.

Motor grader shall be equipped with an operator controlled, multi-disc differential with lock/unlock control.

Motor grader shall be equipped with key lock, hinged, swing-open engine compartment doors for vandalism protection and ease of service.

(b) Transmission:

Built by motor grader manufacturer.

Standard transmission shall provide at least eight (8) speeds forward and six (6) speeds reverse with automatic shifting at optimal shift points.

Direct drive, power shift, counter shaft type.

Transmission shall be equipped with a built-in, self-diagnostic capability.

Transmission shall have electronic shift control with over speed protection.

Transmission shall have an inching pedal for improved modulation and machine control.

Machine shall have no drive shafts that cross over the articulation joint.

(c) Final Drive:

Final drive shall be planetary design.

Tandem drive chain pitch shall not be less than two (2) inches.

6. Brakes – Air Actuated:

Machine shall have primary and secondary service brakes.

Machine to be equipped with air dryer for removing moisture from air system.

The brakes shall be continuously pressurized, filtered and oil-cooled.

Entire braking system shall meet all requirements of ISO 3450.

Four (4) outboard mounted at each wheel service brakes shall be oil disc, sealed from water, mud, and dust.

Service brakes shall be multi-disc, oil-cooled and completely sealed.

7. Wheels and Tires:

All six (6) tires shall be new tubeless type 1400R24 radial Michelin XSNOPLUS with 10-inch by 24-inch size three (3) piece rims **no exceptions or substitutions.**

8. Main Frame:

Front frame shall be flanged, single-box section construction.

Motor grader shall be equipped with rear-mounted scarified and ripper with three (3) ripper shanks and nine (9) scarified teeth.

9. Hydraulics:

Hydraulic pump shall be variable displacement piston type providing pump implement response speed regardless of engine RPMs or simultaneous use of at least three (3) controls engaged.

All hydraulic components shall be built by motor grader manufacturer.

Hydraulic system should be closed center, load sensing with automatically adjusting flow and pressure to the work requirement.

Separate hydraulic lock valves shall be provided in each hydraulic circuit to help prevent cylinder drift for increased blade accuracy.

All hydraulic connections shall have O-ring face seals to prevent leaks, contamination and spillage.

Motor grader shall be equipped with manufacturer blade lift accumulator system to provide cushioning action for blade lift hydraulic circuits during high impact blading applications. Blade float system built into each blade lift control valve.

10. Moldboard:

Moldboard shall be 14' long and equipped with hydraulic side shift and tip control, eight-inch (8") cutting edge, and reversible overlay end bits with 3/4" mounting bolts.

The moldboard should be reinforced by a heavy, continuous weld box section.

Slide rails should be hardened, continuously welded, and have a wear insert top and bottom.

11. Circle and Drawbar:

The moldboard, circle, and drawbar assembly shall be of sturdy construction and shall be attached to the frame by a ball stud. The circle must be capable of 360-degree rotation and be adjustable for wear.

A circle drive slip clutch shall be provided to reduce horizontal moldboard impact damage.

The circle shall be supported by the drawbar with at least six (6) support shoes.

The circle shall be at least 60" in diameter.

Circle and drawbar wear strips shall be replaceable bronze-alloy or nylon composite wear material mounted with no fasteners.

Blade lift and center shift cylinders shall have replaceable wear inserts in the ball sockets.

12. Operator's Station:

The entire control console with all control levers, including attachments and steering wheel, shall be infinitely adjustable with fore and aft as a single unit.

Machine must be equipped with speedometer, tachometer, coolant temperature, and fuel gauge and must have front and rear sun shades.

Machine to be equipped with two (2) outside mounted, moveable, wide-angle, heated rear view mirrors.

Cab to be full height design and sound suppressed with tinted glass with engine noise at no more than 81 DBA and interior of cab at no more than 72 DBA.

Steering wheel shall not be required to operate machine, joystick controls only.

Seat shall be suspension type, adjustable fore and aft, seat height, seat back angle, thigh support and lumbar support with cloth cushion contour series. Seat shall be heated.

Motor grader shall have a frame articulation position indicator in front of the operator within the operator's compartment.

Left and right cab doors shall be provided.

The cab lower windows shall open for ventilation.

Cab floor shall be flush with door bottoms to expedite cab floor cleaning.

Digital machine hour meter shall be provided.

Machine to include cab heater (minimum 40,000 BTU) and to provide outside filtered air circulation, multiple ducting to all windows. Must also include A/C.

Machine to be equipped with radio ready arrangement with 24-volt to 12-volt convertor with speaker, wiring, and antenna (radio included).

Communication convertor (40 AMP, 24/ 1200 LT for two-way radio) included.

13. Safety and Sound Suppression:

Engagement of parking brake control lever shall simultaneously move transmission control to neutral, avoiding accidental transmission engagement.

Motor grader shall be equipped with ROPS (rollover protection structure) and FOPS (falling object protective structure) that meets current OSHA and MSHA regulations.

A seat belt shall be provided that meets OSHA requirements.

Articulation joint shall have a single mechanical locking device to prevent frame articulation while servicing or transporting machine.

Cab shall have four (4) wipers with washers on front upper and both lower windows as well as on rear window for good visibility in poor weather conditions.

14. Articulation:

Articulation joint shall have a shim adjustable bottom with tapered roller bearings.

15. Lighting:

Machine to be equipped with Halogen or LED work lights, including two (2) lower moldboard front-facing lights mounted on cab, one (1) rear-facing light mounted on engine hood, one (1) mounted on right-hand side of cab for wing use, back-up lights and alarm, rotating beacon warning lights, and winter wing light package. All available lights from manufacturer.

Machine to be equipped with directional lights.

16. Manuals:

A hard copy plus a CD copy of each service manual, parts book, and operator's manual to accompany each machine.

17. Attachments:

Options 17A & 17B may be purchased separately and will not be included in the hourly lease price quoted.

- (a) **Option:** Machine to be equipped with quick attach/detach front mount for “V” plow mounting, including a 10’ “V” plow with quick disconnect mount.
- (b) **Option:** Machine to be equipped with 12’ hydraulic snow wing with hydraulic lift on outer end.
- (c) **Required:** Machine to be equipped with necessary hydraulic valves to fully operate attachments (wing, angel bull blade, ripper, and grader.)
- (d) **Required:** Snowplow protection group with brake line covers, front wheel assist hydraulic hose protection, battery box protection, engine compartment, air intake, and covers for engine enclosure louvers.

18. Warranties:

Bidder shall supply, in written form, all warranties included with machine.

**A full, five (5) year warranty** shall be included in the hourly price of the lease. Warranty will **include all travel time and mileage** to work on machinery in the field.

19. Serviceability:

All hydraulic and engine oil filters to be vertically mounted.

Extended life coolant shall be provided.

Separate wiring harness color-coded for ease of identification and sure seal connectors that are weather proof shall be provided.

S.O.S. sampling ports (engine, hydraulics, transmission, coolant, and fuel).

Toolbox shall be included.

20. Each bid shall include a recommended service interval schedule and an estimated fuel usage in gallons per hour.

21. Each bid shall include all filters, oil samples and testing equipment cost for required preventative maintenance services.

22. LEASE MUST HAVE OPTION FOR PURCHASE AND OPTION TO RETURN AT ANY TIME DURING FIVE YEARS WITHOUT PENALTIES.

23. Graders must be delivered to the Flathead County Road Department by **December 15, 2020.**